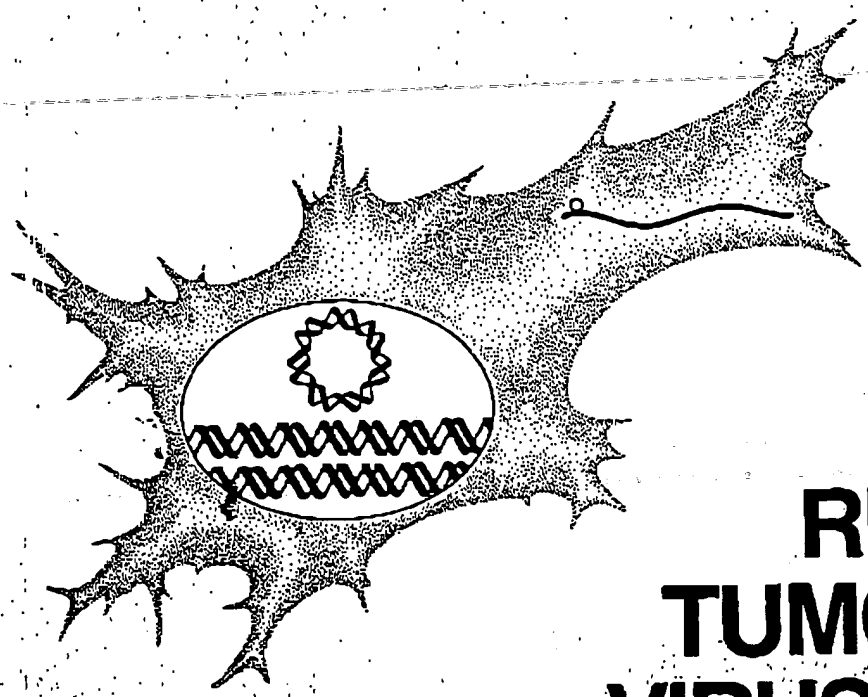
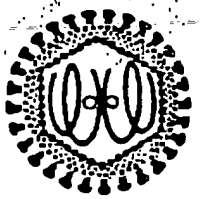
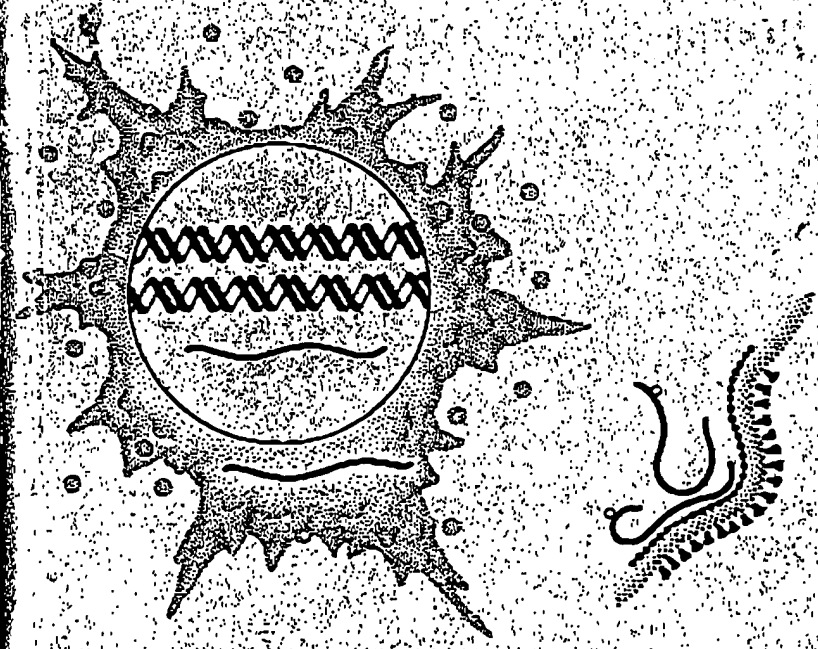


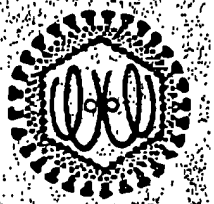


RNA TUMOR VIRUSES

MOLECULAR BIOLOGY OF TUMOR VIRUSES

1 / Text





RNA TUMOR VIRUSES

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those that will grow in cells of the species from which they were isolated, e.g., a mouse virus that propagates best in mouse cells and to a limited or undetectable level in cells of other species. Most ecotropic mouse retroviruses undergo a low level of replication in cells from other rodents, like rats or hamsters, but are generally incapable of replication in cells of higher mammalian species. This phenomenon is attributable to the absence of appropriate receptors for the virus on the surface of the resistant cell (see Chapter 3).

In contrast to the ecotropic viruses are the xenotropic viruses. These are viruses that are endogenous to one species but cannot replicate well in that species, generally because of a receptor block (see below). On the other hand, they tend to have a wide range for replication in cells of heterologous species. A great number of animal species contain endogenous viruses (or parts thereof), which, in addition to being called proviruses, are sometimes called virogenes (see Chapter 10). The majority of endogenous viruses, once activated, display a xenotropic host range. None of the xenotropic viruses has yet been shown to be pathogenic in any animal. On the other hand, both endogenous ecotropic and exogenous ecotropic viruses may be pathogenic. Moreover, a retrovirus need not undergo a complete cycle of replication in order to produce disease. For example, nonproductive infection of heterologous hosts can lead to tumor formation (e.g., avian Rous sarcoma virus [RSV] in rats or murine sarcoma virus [MSV] in hamsters). Further host-range restrictions that pertain to retroviruses are discussed in the appropriate sections and in Chapter 3.

3. *Transmission*

The etiological agents of infectious diseases are usually transmitted from host to host within a population by contact, aerosols, insect vectors, or other methods. Retroviruses, like other viruses, may be transmitted from one host animal to another by contact, but a frequent mode of transmission is from parent to offspring. Gross (1944, 1970) distinguished these two routes of transmission from one organism to another as horizontal transmission and vertical transmission, respectively. We now recognize two modes of vertical transmission, congenital infection and genetic transmission, which are quite different at the molecular level and are consequently affected by different biological controls.

Congenital infection occurs when infectious viral particles re-

Table 2.6 Host range of murine C-type retroviruses

Cells	Ecotropic MLV	Xenotropic MLV	Amphotropic MLV	MCF-MLV
Mouse[a]	+	–	+	+
Rat	+	+	+	+
Hamster	–	–	–	–
Guinea pig	–	+	+	+
Rabbit	–	+	+	+
Mink	–	+	+	+
Cat	–	+	+	+
Dog	–	+	+	?[b]
Bat	–	–	?	?
Pig	–	–	?	?
Cow	–	+	–[c]	?
Deer	–	+	+	?
Horse	–	+	?	?
Monkey	–	+	+	?
Human	–	+	+	–[d]
Chicken	–	–	–[c]	?
Duck, quail	–	+	–	?
Pheasant	–	+	?	?
Turkey	–	+	?	?

Some variations are noted, dependent on particular cell line and virus strain; consensus data are presented. (+) Replication-positive; (–) no replication; (?) no information available.

[a]Replication in mouse cells is subject to *Fv-1* restriction of particular cells used (e.g., primary cells vs. established cell lines). Xenotropic MLV replication in mouse cells is subject to receptor restriction and intracellular restriction (for further discussion, see Chapter 3).

[b]Although not tested formally, MCF-MLV should replicate in all cells permissive to xenotropic MLV.

[c]One isolate replicates in bovine and chicken cells (Rasheed et al. 1977) (see Section II.G.2).

[d]Only one cell line tested (Hartley and Rowe 1976).

to the overall picture. Thus, the following sections will focus on the viruses of historical or pathological importance. In summary, ecotropic MLVs have been isolated from nearly every mouse strain from which they have been sought; three notable exceptions include the NIH-Swiss, strain 129, and NZB mice. Xenotropic MLVs have been obtained from NIH and NZB mice (see Section II.G.1.c); however, infectious virus has never been isolated from strain-129 mice. Interestingly, strain-129 mice contain endogenous virus sequences like those of every other mouse examined (Lowy et al. 1974) and were used to define the G_{IX} antigen found on normal thymocytes of this strain and on leukemic thymocytes (Geering et